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Emergency Preparedness Among Emergency Nurses in Saudi Arabia: A Cross-Sectional Study

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ABSTRACT:

Background: Emergency nurses play a critical role in hospital disaster preparedness and response; however, evidence regarding their preparedness across specific emergency-response domains in Saudi Arabia remains limited. Adequate familiarity with emergency response procedures is essential for safe and effective patient care. Assessing nurses' preparedness can help identify educational needs and guide targeted training and capacity-building initiatives.

Aim: The study aimed to assess emergency nurses' self-reported familiarity with emergency preparedness competencies and to examine differences in preparedness scores according to selected sociodemographic and professional characteristics.

Design: A quantitative, descriptive, cross-sectional design was utilized in the current study.

Setting: The study was conducted in the emergency department of Huraymila General Hospital.

Sample: All emergency nurses currently employed at Huraymila General Hospital were recruited as study sample (n=150).

Tool: Data were collected using a self-administered questionnaire comprising sociodemographic characteristics and the 44-item Emergency Preparedness Information Questionnaire (EPIQ), which assesses nurses' self-reported familiarity with emergency preparedness competencies across eight domains.

Results: The participants had a mean age of 38.55 ± 10.01 years. The overall EPIQ mean score was 3.51 ± 1.011. The highest domain score was observed for Triage (M = 3.86, SD = 0.918), whereas the lowest was observed for Biological Agents (M = 3.17, SD = 0.984). No statistically significant differences in total EPIQ scores were identified according to gender, marital status, educational level, occupational title, emergency department

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experience, or work shift. Age was not significantly correlated with total EPIQ score (r = -.035, p = .668).

Conclusion: Emergency nurses demonstrated moderate self-reported familiarity with emergency preparedness, with the highest familiarity in triage and the lowest in biological-agent competencies. Targeted education, regular multidisciplinary drills, and simulation-based training may strengthen preparedness in areas of lower familiarity and support emergency response readiness.

INTRODUCTION

Hospitals may face disasters and other emergency events that can rapidly disrupt routine healthcare delivery and place substantial demands on healthcare systems. Effective emergency preparedness is essential to protect patients, visitors, and healthcare personnel while maintaining the continuity and safety of essential healthcare services (Alruwaili, et al., 2023). Preparedness requires coordinated planning and response strategies that enable healthcare organizations to manage sudden increases in patient volume, limited resources, communication challenges, and the diverse clinical needs of patients during emergency situations (Alharbi, et al., 2022).

Emergency departments (EDs) are particularly important in disaster and emergency preparedness because they frequently serve as an initial point of care and may experience a substantial influx of patients during large-scale or complex emergencies (Sofuoglu, et al., 2024). Emergency nurses play a central role in these situations through patient assessment and triage, prioritization of care, communication, coordination with multidisciplinary teams, implementation of emergency response procedures, and provision of psychological and clinical support (Karnjuš, et al., 2021). Nurses' familiarity with established emergency preparedness procedures is therefore an important component of an effective and coordinated healthcare response.

The increasing frequency and complexity of natural and human-induced disasters further highlight the need for healthcare organizations to maintain a prepared and competent nursing workforce (Tas & Cakir, 2022). Emergency preparedness is a multidimensional concept that extends beyond general knowledge of disaster procedures.

It encompasses competencies related to incident command, triage, communication and connectivity, psychological issues and special populations, isolation and decontamination, epidemiology and clinical decision-making, reporting and access to critical resources, and biological-agent preparedness (Karimi Dehkordi, et al., 2021). Assessing nurses' self-reported familiarity across these domains can help identify areas requiring further education and training and can support the development of targeted preparedness interventions (Lin, et al., 2023).

In Saudi Arabia, the preparedness of emergency nurses is particularly important given the need for healthcare services to respond effectively to a range of emergencies events. Despite the central role of nurses in emergency response, evidence regarding their preparedness across specific emergency-response domains remains limited in some Saudi healthcare settings. Evaluating emergency nurses' familiarity with key preparedness competencies may provide useful information for healthcare organizations and nursing educators when developing continuing education, simulation-based training, and disaster preparedness exercises.

METHODS

Design

A quantitative, descriptive cross-sectional design was utilized in the current study. Data were collected at a single point in time using a structured self-administered questionnaire.

Aim

The study aimed to assess emergency nurses' self-reported familiarity with emergency preparedness competencies and to examine differences in preparedness scores according to selected sociodemographic and professional characteristics.

Setting

The study was conducted in emergency department of Huraymila General Hospital, Riyadh Third Health Cluster, Riyadh, Saudi Arabia.

Population

The target population consisted of registered nurses working in emergency departments of Huraymila General Hospital Riyadh Third Health Cluster during the study period.

Sample, Sampling Technique, and Sample Size

A convenience sampling method was used to recruit participants from among the emergency nurses.

Inclusion Criteria

Registered nurses working in the emergency department of Huraymila General Hospital, had been employed in the emergency department for at least three months, were involved in direct patient care, were able to understand and complete the study questionnaire in English, and provided informed consent to participate.

Exclusion Criteria

Nurses were excluded if they were on extended leave during the data-collection period, were administrative or non-clinical nursing staff, had less than three months of emergency department experience, or declined to provide informed consent.

Sample Size

The required sample size was determined using Cochran's formula for estimating a sample size for a cross-sectional study. The calculation was based on a 95% confidence level, a 5% margin of error, and an assumed population proportion of 50%, which provides the maximum required sample size when the population proportion is unknown. The calculated minimum sample size was approximately 384 participants. However, because the accessible population of eligible emergency nurses was limited, a finite-population correction was applied based on the total number of eligible nurses. The final required sample size was determined accordingly, and 150 emergency nurses participated in the study.

INSTRUMENTS

Part I: Sociodemographic Data

Developed by the researcher, containing 7 questions on age, gender, marital status, qualifications, occupational title, years of experience in the ER and working shift.

Part II: Emergency Preparedness Information Questionnaire (EPIQ)

Developed by Wisniewski et al., (2004), The Emergency Preparedness Information Questionnaire (EPIQ) was originally developed as a 44-item instrument assessing nurses' self-reported familiarity with emergency preparedness competencies. It measures eight dimensions:

1. Incident Command System (8 items)
2. Triage (5 items)
3. Communications (8 items)
4. Psychological Issues and Vulnerable Populations (6 items)
5. Isolation, Quarantine, and Decontamination (5 items)
6. Epidemiology and Clinical Decision-Making (4 items)
7. Access to Critical Resources and Reporting (4 items)
8. Familiarity with Biological Agents (4 items)

In the present study, the original eight-domain structure was retained to facilitate consistency with the version of the EPIQ used and to allow comparison with previous studies.

Scoring System

The items are rated on a 5-point Likert scale (1 = Unfamiliar to 5 = Very familiar).

- Minimum possible total score: 44
- Maximum possible total score: 220

Validity

The EPIQ is an established 44-item instrument designed to assess nurses' self-reported familiarity with emergency preparedness competencies. In the present study, the questionnaire was reviewed by nursing and emergency preparedness experts to assess the relevance, clarity, and appropriateness of the items. Their recommendations were incorporated before data collection, and a pilot study was conducted to assess the clarity and applicability of the instrument. As factorial validity was not independently assessed in the present sample, the findings are interpreted as reflecting self-reported emergency preparedness rather than objectively measured knowledge or competence.

Reliability

The Emergency Preparedness Information Questionnaire (EPIQ) demonstrated excellent internal consistency in a previous Iranian study, with a reported Cronbach's alpha of 0.98 (Azizpour et al., 2022).

Pilot Study

A pilot study was conducted on 10 % of cases (15 nurses) to assess the clarity and internal consistency of the EPIQ before the main data collection. Internal consistency was evaluated using Cronbach's alpha in SPSS, yielding a coefficient of 0.931, which indicates excellent internal consistency. The pilot findings supported the reliability and suitability of the questionnaire for use in the main study and they were excluded from the study.

Data Collection Procedures (Step by Step)

Several systematic steps were followed to carry out the data collection. Obtaining ethical approval from the relevant committees was the first step. Informative leaflets describing the research goals, methods, and the rights of the participants were designed and given out. A consent form was given to each participant, which they read and signed, and was submitted to the investigators before the actual participation.

Following the signing of the consent forms, questionnaires was handed over to the nurses who are willing and fit to respond to the study. The participants were given the freedom to respond to the questionnaires whenever it is suitable for them. On completion, all questionnaires were collected and the filled-in pages reviewed for completeness. In the end, all the replies were kept in a secure place in a way that ensures confidentiality and anonymity of the participants.

Data Analysis Plan

Data were analyzed using IBM SPSS Statistics version 29. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participant characteristics and EPIQ scores. Independent-samples t-tests were used to compare mean EPIQ scores between two-group categorical variables, while one-way analysis of variance (ANOVA) was used for variables with more than two groups.

Pearson's correlation coefficient was used to examine the association between age and total EPIQ score and the correlations among EPIQ domains. Statistical significance was set at $p < .05$. Prior to inferential analyses, relevant assumptions were assessed. Missing data were examined and handled according to a predefined approach.

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RESULTS

Table 1: Distribution of Study Participants According to Sociodemographic Characteristics (N=150)

Variable	Category	Frequency	Percentage
Gender	Male	25	16.7
	Female	125	83.3
Age	Mean ± SD	38.55 ± 10.005	
Marital Status	Single	36	24.0
	Married	97	64.7
	Other	17	11.3
Education Level	Diploma	38	25.3
	Bachelor's	95	63.3
	Master's	17	11.3
Years of experience in the Emergency Room	Less than 1 Year	24	16.0
	1-5 Years	52	34.7
	6-10 Years	26	17.3
	Above 10 Years	48	32.0
Occupational Title	Staff Nurse	102	68.0
	Charge Nurse	25	16.7
	Head Nurse	23	15.3
Type of Work Shift	8 Hours	129	86.0
	12 Hours	21	14.0

Table 1 indicates that out of the 150 participants, most of them were females (83.3%), and their mean age was 38.55 ± 10.01 years. The majority of the participants were married (64.7%), whereas 24.0% were single. About the level of education, almost two-thirds of the participants were bachelor's degree holders (63.3%), and the rest were diploma holders (25.3%) and master's degree holders (11.3%). Based on their emergency room experience, the biggest group was quite new to the profession, having just 1-5 years of experience (34.7%), followed by those with the experience of more than 10 years (32.0%). Most participants were staff nurses (68.0%), and the majority (86.0%) of the participants worked 8-hour shifts.

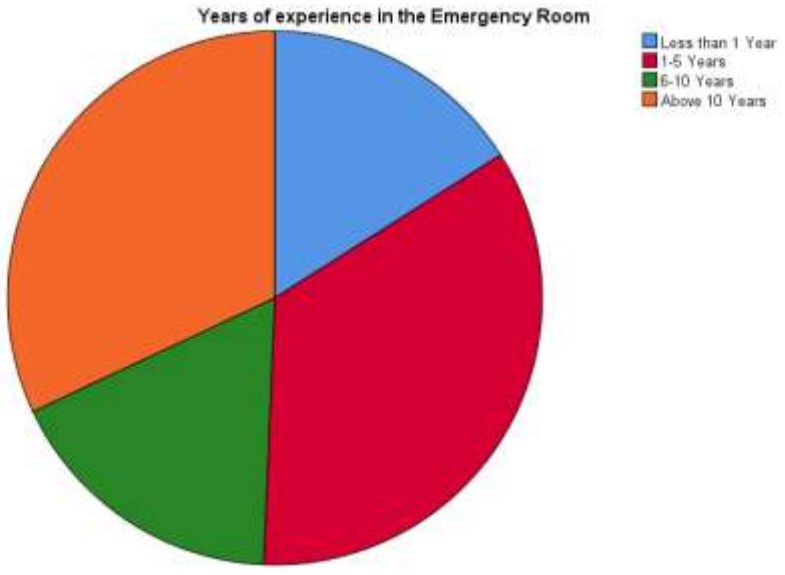


Figure 1: Years of Experience

Table 2: Descriptive Statistics of Main Study Variables

Variable	Mean	SD
Incident Command System	3.54	1.083
Triage	3.86	.918
Communication and Connectivity	3.64	1.079
Psychological Issues and Special Populations	3.57	1.111
Isolation, Decontamination, and Quarantine Factor	3.69	1.181
Epidemiology and Clinical Decision-Making Factor	3.36	1.240
Reporting and Accessing Critical Resources	3.30	1.259
Biological Agents	3.17	.984
Emergency Preparedness Information Questionnaire Total	3.51	1.011

Table 2 presents the descriptive statistics for the EPIQ domains. The overall mean score indicated moderate self-reported familiarity with emergency preparedness competencies (M = 3.51, SD = 1.011). Triage had the highest mean score (M = 3.86, SD = 0.918), followed by Isolation, Decontamination, and Quarantine (M = 3.69, SD = 1.181) and Communication and Connectivity (M = 3.64, SD = 1.079). The lowest mean score was observed for Biological Agents (M = 3.17, SD = 0.984), followed by Reporting and Accessing Critical Resources (M = 3.30, SD = 1.259), indicating relatively lower self-reported familiarity in these areas.

Table 3: Descriptive Statistics of Emergency Preparedness Information Questionnaire

	Items	Mean	Std. Deviation
Incident Command System	1. The function group of the incident command system (ICS) to which you are assigned during large-scale emergency events.	3.21	1.339
	2. The physical location to which you would report if a large-scale emergency event were to occur.	3.67	1.278
	3. Your agency's preparedness level for responding to large-scale emergency events.	3.67	1.212
	4. The content of the emergency operations plan, or major incident plan, in your agency/organization.	3.63	1.190
	5. The strategic rationale used to develop the ICS response and action plan.	3.43	1.271

	6. Assessing site safety for yourself, co-workers, and victims during large-scale emergency events.	3.81	1.168
	7. Differences between the ICS's decision-making processes for large-scale emergency and non-emergency events.	3.43	1.244
	8. Tasks that should not be delegated to volunteers during large-scale emergency events.	3.43	1.261
Total Incident Command System		3.54	1.083
Triage	9. Performing a rapid physical assessment of a victim of large-scale emergency events.	3.75	1.158
	10. Assisting with triage during large-scale emergency events.	3.92	1.090
	11. Basic first aid, including oxygen administration State departments of health during large-scale emergency events.	4.13	1.034
	12. Performing a rapid mental health assessment of a victim of a large-scale emergency event.	3.78	1.055
	13. Evaluating the effectiveness of your actions during large-scale emergency events.	3.72	1.081
Total Triage		3.86	.918
Communication and Connectivity	14. The chain of custody during large-scale emergency events.	3.70	1.151
	15. Identifying the different abilities of key partners in your emergency operation or major incident plans.	3.61	1.152
	16. The procedure for documenting provision of care during large-scale emergency events.	3.57	1.261
	17. Process of gaining access to the Saudi Arabia's national strategic stockpile.	3.68	1.189
	18. Effectively presenting information about the degree of risk to different audiences.	3.69	1.164
	19. Appropriate debriefing activities following a large-scale emergency event.	3.53	1.213
	20. Procedures for communicating critical patient information to people transporting patients.	3.62	1.180
	21. The use of all types of communication devices.	3.68	1.160
Total Communication and Connectivity		3.64	1.079
Psychological Issues and Special Populations	22. Signs of post-traumatic stress in patients who have been seen for routine healthcare checks following a large-scale emergency event.	3.58	1.211
	23. Detecting and evaluating post-traumatic stress or other mental health problems in a child or teenager.	3.55	1.173

	24. Appropriate psychological support for all parties involved in a large-scale emergency event.	3.65	1.199
	25. Providing health counseling and education to patients on the long-term impact of chemical, biological, radiological, nuclear, and explosive (CBRNE) agents.	3.45	1.235
	26. The appropriate care of sensitive/vulnerable patients during large-scale emergency events.	3.61	1.192
	27. Procedures for providing care to children and younger people during large-scale emergency events when consent cannot be obtained from their parents or legal guardians.	3.60	1.259
Total Psychological Issues and Special Populations		3.57	1.111
Isolation, Decontamination, and Quarantine Factor	28. Selecting the appropriate personal protective equipment when caring for patients exposed to chemical, biological, radiological, nuclear, and explosive (CBRNE) agents.	3.82	1.259
	29. Isolation procedures for people exposed to biological or chemical agents.	3.75	1.274
	30. Your facility's isolation and quarantine procedures.	3.73	1.294
	31. The decontamination procedures stated in your facility's emergency operations or major incident plans.	3.55	1.319
	32. The impact on the environment of large-scale emergency events.	3.58	1.233
Total Isolation, Decontamination, and Quarantine Factor		3.69	1.181
Epidemiology and Clinical Decision-Making Factor	33. Match antidote and prophylactic medications to specific biological/chemical agents.	3.27	1.390
	34. Assessing history and physical assessment surveillance data when there is a high index of suspicion that a patient has been exposed to a category A, B, or C biological agent.	3.30	1.330
	35. Ability to identify the exacerbation of underlying diseases due to exposure to chemical, biological, radiological, nuclear, and explosive (CBRNE) agents.	3.41	1.285
	36. The ethical, legal, cultural, and safety issues relating to the proper handling of the dead during large-scale emergency events.	3.45	1.314
Total Epidemiology and Clinical Decision-Making Factor		3.36	1.240
Reporting and Accessing Critical Resources	37. The diseases that are immediately reportable to the Local and Ministry of Health and regional health directorates	3.43	1.338
	38. When unusual symptoms should be reported to local and Ministry of Health and regional health directorates	3.33	1.303

	39. Determining the appropriate agency to which reportable diseases are to be directed.	3.23	1.342
	40. Where to quickly access up-to-date resources about specific chemical, biological, radiological, nuclear, and explosive (CBRNE) agents.	3.19	1.345
Total Reporting and Accessing Critical Resources		3.30	1.259
Biological Agents	41. Signs and symptoms of anthrax inhalation.	3.33	1.318
	42. Modes of transmission for different types of biological agents, such as anthrax and smallpox.	3.33	1.344
	43. Possible adverse reactions to smallpox vaccination.	3.22	1.345
	44. Signs and symptoms attributable to exposure to different biological agents.	2.79	1.172
Total Biological Agents		3.17	.984
Total Emergency Preparedness Information Questionnaire		3.51	1.011

Table 3 presents item-level and domain-level EPIQ scores. The overall mean score indicated moderate self-reported familiarity with emergency preparedness competencies (M = 3.51, SD = 1.011). The highest-rated items were basic first aid and oxygen administration (M = 4.13), assisting with triage (M = 3.92), and assessing site safety during large-scale emergencies (M = 3.81). In contrast, the lowest-rated items were recognizing signs and symptoms of exposure to biological agents (M = 2.79), identifying appropriate resources for CBRNE agents (M = 3.19), and identifying the appropriate agency for reporting diseases (M = 3.23). These findings indicate relatively greater self-reported familiarity with routine emergency response competencies and lower familiarity with specialized biological-agent, reporting, and resource-management competencies.

Table 4. Differences in Emergency Preparedness Information Questionnaire Scores According to Sociodemographic and Professional Characteristics

Variable	Statistical test	Test statistic	p-value
Gender	Independent-samples *t*-test	0.936	.335
Marital status	One-way ANOVA	0.054	.947
Educational level	One-way ANOVA	1.318	.271
Occupational title	One-way ANOVA	0.785	.458
Years of experience in the Emergency Room	One-way ANOVA	1.897	.133
Type of work shift	Independent-samples *t*-test	0.008	.929

Note. For independent-samples *t*-tests, the test statistic is reported as *t*; for one-way ANOVA, it is reported as *F*. Statistical significance was set at $p < .05$.

Table 4 presents the differences in Emergency Preparedness Information Questionnaire (EPIQ) scores according to selected sociodemographic and professional characteristics. No statistically significant differences in EPIQ scores were observed according to gender (p = .335), marital status (p = .947), educational level (p = .271), occupational title (p = .458), years of experience in the Emergency Room (p = .133), or type of work shift (p = .929). These findings indicate that emergency preparedness knowledge, as measured by the EPIQ, did not differ significantly across the examined sociodemographic and professional groups.

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Table 5: Pearson correlation between demographic and Emergency Preparedness Information Questionnaire

Correlations		
		TOTAL_EPIQ
Age	Pearson Correlation	-.035
	Sig. (2-tailed)	.668

P-value is not statistically significant (P <0.05)

Table 5 presents the Pearson correlation between participants' age and total EPIQ score. A very weak negative correlation was observed between age and total EPIQ score (r = −.035); however, this association was not statistically significant (p = .668). These findings indicate that no statistically significant linear association between age and self-reported familiarity with emergency preparedness competencies was detected in the study sample.**Table 6.** Pearson Correlations Among Emergency Preparedness Information Questionnaire Domains

		Incident Command System	**Triage**	**Communication and Connectivity**	**Psychological Issues and Special Populations**	**Isolation, Decontamination, and Quarantine Factor**	**Epidemiology and Clinical Decision-Making Factor**	**Reporting and Accessing Critical Resources**	**Biological Agents**	**Total Emergency Preparedness Information Questionnaire**
Incident Command System	Pearson Correlation	1	.828**	.853**	.784**	.753**	.792**	.759**	.670**	.880**
	Sig. (2-tailed)		0	0	0	0	0	0	0	0
Triage	Pearson Correlation	.828**	1	.859**	.813**	.770**	.755**	.736**	.685**	.877**
	Sig. (2-tailed)	0		0	0	0	0	0	0	0
Communication and Connectivity	Pearson Correlation	.853**	.859**	1	.884**	.809**	.819**	.789**	.741**	.923**
	Sig. (2-tailed)	0	0		0	0	0	0	0	0
Psychological Issues and Special Populations	Pearson Correlation	.784**	.813**	.884**	1	.854**	.845**	.821**	.794**	.931**
	Sig. (2-tailed)	0	0	0		0	0	0	0	0
Isolation, Decontamination, and	Pearson Correlation	.753**	.770**	.809**	.854**	1	.862**	.819**	.800**	.916**

Quarantine Factor	Sig. (2-tailed)	0	0	0	0		0	0	0	0
Epidemiology and Clinical Decision-Making Factor	Pearson Correlation	.792**	.755**	.819**	.845**	.862**	1	.938**	.875**	.949**
	Sig. (2-tailed)	0	0	0	0	0		0	0	0
Reporting and Accessing Critical Resources	Pearson Correlation	.759**	.736**	.789**	.821**	.819**	.938**	1	.879**	.929**
	Sig. (2-tailed)	0	0	0	0	0	0		0	0
Biological Agents	Pearson Correlation	.670**	.685**	.741**	.794**	.800**	.875**	.879**	1	.885**
	Sig. (2-tailed)	0	0	0	0	0	0	0		0
Total Emergency Preparedness Information Questionnaire	Pearson Correlation	.880**	.877**	.923**	.931**	.916**	.949**	.929**	.885**	1
	Sig. (2-tailed)	0	0	0	0	0	0	0	0	
****. Correlation is significant at the 0.01 level (2-tailed).**										

Table 6 presents the Pearson correlation coefficients among the dimensions of the Emergency Preparedness Information Questionnaire and the total questionnaire score. The findings demonstrated positive and statistically significant correlations among all questionnaire dimensions ($p < .001$), indicating that higher scores in one dimension were associated with higher scores in the other dimensions. Pearson's correlation coefficient measures the strength and direction of the linear association between variables, with positive coefficients indicating that the variables increase together.

The correlations between the Incident Command System domain and the other domains ranged from $r = .670$ to .853, with the strongest correlation observed with Communication and Connectivity ($r = .853$, $p < .001$) and the weakest with Biological Agents ($r = .670$, $p < .001$). The Triage domain showed strong positive correlations with the remaining domains, ranging from $r = .685$ to .859 ($p < .001$), with the strongest correlation observed with Communication and Connectivity ($r = .859$, $p < .001$).

The Communication and Connectivity domain demonstrated strong positive correlations with all other domains, ranging from $r = .741$ to .884 ($p < .001$). Its strongest association was with Psychological Issues and Special Populations ($r = .884$, $p < .001$). Similarly, Psychological Issues and Special Populations showed strong positive correlations with the other dimensions, ranging from $r = .784$ to .854 ($p < .001$).

The Isolation, Decontamination, and Quarantine domain was strongly correlated with the other dimensions, with coefficients ranging from $r = .753$ to .862 ($p < .001$). The Epidemiology and Clinical Decision-Making domain demonstrated particularly strong associations, ranging from $r = .755$ to .938 ($p < .001$). Its strongest correlation was with Reporting and Accessing Critical Resources ($r = .938$, $p < .001$).

The Reporting and Accessing Critical Resources domain also showed strong positive correlations with the other dimensions, ranging from r = .736 to .938 (p < .001). The Biological Agents domain demonstrated positive correlations ranging from r = .670 to .885 (p < .001), with its strongest association observed with the total questionnaire score.

Overall, all eight domains demonstrated strong and statistically significant positive correlations with the Total Emergency Preparedness Information Questionnaire score, with correlation coefficients ranging from r = .877 to .949 (p < .001). The strongest correlation with the total questionnaire score was observed for Epidemiology and Clinical Decision-Making (r = .949, p < .001), followed by Psychological Issues and Special Populations (r = .931, p < .001) and Reporting and Accessing Critical Resources (r = .929, p < .001). The weakest, although still strong, correlation was observed for Biological Agents (r = .885, p < .001).

DISCUSSION

Levels of Emergency Preparedness Among Emergency Nurses

The findings of the present study showed that emergency nurses reported moderate self-reported familiarity with emergency preparedness competencies, with an overall EPIQ mean score of 3.51 ± 1.01. Among the eight domains, triage demonstrated the highest mean score (3.86), whereas biological agents had the lowest (3.17). The relatively higher familiarity with triage may be related to the frequent involvement of emergency nurses in patient assessment, prioritization, and management of patients with varying levels of acuity.

In contrast, the lower familiarity with biological-agent preparedness may indicate an area requiring greater attention through targeted education and simulation-based training. These findings are consistent with previous research indicating that emergency nurses may demonstrate moderate levels of disaster preparedness, with variation across specific competency domains (Setyawati, et al., 2020 & Guo, et al., 2023).

Similarly, Motsepe and Schmollgruber (2025) reported higher familiarity with triage and basic first aid compared with other emergency preparedness competencies, while some clinical decision-making areas demonstrated lower levels of familiarity. This pattern supports the finding that preparedness may vary across competency areas according to nurses' exposure to and experience with specific emergency response activities. In contrast, Abuzied and Salah (2024) reported poor disaster preparedness among emergency department nurses in Egypt. The differences between these findings may be related to variations in healthcare systems, institutional preparedness programs, training opportunities, previous disaster exposure, and the characteristics of the study populations.

Relationship Between Sociodemographic Characteristics and Emergency Preparedness

The present study found no statistically significant differences in total EPIQ scores according to gender, marital status, educational level, occupational title, emergency department experience, or work shift. In addition, age was not significantly correlated with total EPIQ score (r = -0.035, p = .668). These findings indicate that self-reported familiarity with emergency preparedness was relatively similar across the demographic and professional groups examined.

These findings are consistent with Tuquero et al. (2025), who reported that demographic characteristics such as age and income were not significantly associated with disaster preparedness among nursing students, whereas previous disaster exposure was associated with preparedness. Similarly, Emaliyawati et al. (2021) and Lin et al. (2023) reported that characteristics such as educational level and gender were not significantly associated with preparedness scores. These findings suggest that demographic characteristics alone may not adequately explain differences in emergency preparedness and that contextual factors, such as training, previous emergency exposure, and institutional preparedness activities, may also be important.

However, findings from Şahin and Karaca (2025) differed from those of the present study, reporting significant associations between selected demographic characteristics, previous disaster experience, and preparedness-related outcomes. Such differences may reflect variations in study populations, healthcare settings, preparedness programs, and exposure to disaster-related activities.

Therefore, the absence of significant associations in the present study should not be interpreted as evidence that demographic or professional characteristics have no relationship with preparedness.

RELATIONSHIPS AMONG EMERGENCY PREPAREDNESS DOMAINS

Correlation analysis demonstrated positive associations among the EPIQ domains. These findings indicate that nurses who reported greater familiarity with one area of emergency preparedness also tended to report greater familiarity with other areas. Similar relationships among disaster preparedness competencies have been described by Al Thobaity (2024), who identified several interrelated competency areas, including communication, incident management, and preparedness planning.

Chegini, et al., (2022) also reported relationships among different preparedness competencies, supporting the multidimensional nature of emergency preparedness. However, the correlations between individual EPIQ domains and the total preparedness score in the present study should be interpreted cautiously because the total score is derived from the domain scores. Therefore, these correlations should not be interpreted as independent evidence that emergency preparedness constitutes a single integrated construct.

Furthermore, previous research has indicated that some preparedness domains may remain less developed than others, particularly competencies requiring specialized technical knowledge or less frequent exposure (Ghorbankhani et al., 2024).

This is consistent with the relatively lower familiarity with biological-agent preparedness observed in the present study. These findings support the importance of targeted training rather than assuming that general preparedness automatically translates into equal familiarity across all competency areas (Farhat et al., 2024).

Overall, the findings suggest that emergency nurses demonstrated moderate self-reported familiarity with emergency preparedness competencies, with relatively higher familiarity in triage and lower familiarity in biological-agent preparedness. These findings highlight the potential value of regular disaster drills, simulation-based education, and targeted competency development. Future research should combine self-reported preparedness measures with objective knowledge assessments and observed performance during disaster or hospital evacuation exercises to determine whether perceived preparedness translates into effective emergency response and patient safety.

IMPLICATIONS

Healthcare organizations should strengthen emergency preparedness by addressing the identified gaps, particularly in biological hazards, reporting, critical resources, and epidemiological decision-making. Regular multidisciplinary drills and disaster exercises are recommended to reinforce preparedness.

Nursing Education and Professional Development: Nursing education should provide targeted, competency-based training in areas of lower familiarity, using simulation, tabletop exercises, and case-based learning. Such approaches can improve nurses' knowledge, skills, confidence, and preparedness.

Emergency Nursing Practice: Emergency nurses should maintain competency in both frequently encountered and less common disaster-related situations. Regular competency assessment and continuing education are needed to sustain readiness for high-consequence events.

Nurse Managers and Educators: Preparedness programs should be available to all emergency nurses rather than targeted only to specific demographic or professional groups. Managers and educators should use competency assessments to identify specific learning needs and guide training priorities.

Patient Safety and Quality Improvement: Strengthening disaster preparedness competencies may support more coordinated and effective emergency responses. Disaster preparedness should therefore be incorporated into routine competency assessment, staff education, and quality-improvement activities.

Future Research: Future studies should use larger, multicenter, and longitudinal designs and evaluate educational interventions targeting identified competency gaps. Objective assessments, simulation performance, and observed practice should complement self-reported preparedness measures.

LIMITATIONS

Several limitations should be considered when interpreting the findings of this study. First, the descriptive cross-sectional design provides a snapshot of emergency nurses' self-reported familiarity with emergency preparedness competencies at a single point

in time and therefore does not permit conclusions regarding causality or changes in preparedness over time. Second, the study was conducted in emergency department within the Riyadh Third Health Cluster, which may limit the generalizability of the findings to nurses working in other health clusters, regions, or healthcare systems with different organizational structures, resources, and emergency preparedness programs.

Third, convenience sampling may have introduced selection bias because participation depended on nurses' availability and willingness to participate. In addition, the study used an English-language questionnaire, which may have influenced participation or responses among nurses with different levels of English-language proficiency. Fourth, the EPIQ relies on self-reported familiarity with emergency preparedness competencies; therefore, responses may be affected by recall or social desirability bias and may not accurately reflect nurses' objective knowledge, clinical competence, or actual performance during an emergency or hospital evacuation. Finally, the exclusion of nursing interns, students, and nurses who were not directly involved in patient care limits the applicability of the findings to the broader nursing workforce. Future studies should consider multicenter sampling and incorporate objective knowledge assessments, simulation-based evaluations, and observed performance during emergency or evacuation drills to provide a more comprehensive assessment of preparedness.

RECOMMENDATIONS

Based on the findings of this study, several recommendations are proposed to strengthen emergency preparedness among emergency nurses. Healthcare organizations should provide regular, structured emergency preparedness training that addresses the specific competency areas assessed by the EPIQ. Particular attention should be given to biological-agent preparedness and reporting and access to critical resources, which demonstrated relatively lower levels of self-reported familiarity in the present study. Training should include simulation-based exercises, scenario-based workshops, and practical drills to reinforce nurses' familiarity with emergency response procedures.

Hospitals should also conduct regular multidisciplinary emergency preparedness and evacuation exercises to strengthen coordination, communication, incident command processes, and understanding of individual roles and responsibilities during emergencies. Preparedness protocols and communication pathways should be clearly communicated to emergency nursing staff and reviewed periodically to ensure that they remain current and accessible.

Nursing education programs and healthcare institutions should collaborate to strengthen disaster and emergency preparedness content within undergraduate and continuing professional development programs. Educational activities should address both general emergency preparedness and specialized areas such as biological hazards, isolation and decontamination procedures, reporting mechanisms, and access to critical resources.

Future research should use multicenter designs and include objective assessments of emergency preparedness, such as knowledge tests, simulation-based evaluations, and observed performance during emergency or evacuation drills. Longitudinal and intervention studies are also recommended to evaluate whether structured training and simulation programs improve preparedness and translate into improved performance during emergency situations.

CONCLUSION

Emergency nurses in the Huraymila General Hospital, Riyadh Third Health Cluster demonstrated moderate self-reported familiarity with emergency preparedness competencies. Familiarity was highest in the triage domain and lowest in biological-agent preparedness, indicating areas that may benefit from greater educational attention. No statistically significant differences in total EPIQ scores were identified according to the examined sociodemographic and professional characteristics, suggesting that preparedness may not vary substantially across these groups within the study sample. The significant positive correlations among the EPIQ domains indicate that the different areas of emergency preparedness are closely related; however, these findings should not be interpreted as establishing a single integrated construct because the study did not assess factorial validity.

The findings support the importance of continuous emergency preparedness education, regular multidisciplinary drills, and simulation-based training, with particular attention to biological-agent preparedness and reporting and access to critical resources. Strengthening disaster preparedness within nursing education and continuing professional development may further support emergency nurses' readiness to respond effectively to emergency situations. Future research should incorporate

objective knowledge assessments and observed performance during simulation or evacuation exercises to determine whether self-reported preparedness translates into effective emergency response and patient safety.

AUTHOR CONTRIBUTIONS

E.A.A.: Conceptualization, methodology, investigation, data curation, formal analysis, writing original draft, writing review and editing, and project administration.

S.H.H.: Supervision, methodology, scientific guidance, and writing review and editing.

M.H.E.: Supervision, methodology, scientific guidance, and writing review and editing. All authors reviewed and approved the final manuscript.

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DATA AVAILABILITY

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

DECLARATIONS

Ethics Approval and Consent to Participate

The research was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (World Medical Association). Before data collection, ethical approval was obtained from the Institutional Review Board (IRB) (No. 25-40-R3) of Almaarefa University and the Research and Ethics Committee of Huraymila General Hospital, Third Health Cluster, along with the necessary institutional permissions. Participants were fully informed about the purpose, procedures, and potential benefits of the study before participation. Written informed consent was obtained from all participants before their involvement in the study. Participation was entirely voluntary, and participants had the right to withdraw from the study at any time without any penalty. The researchers ensured strict confidentiality and privacy of all collected data throughout the study.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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